



## $\text{NH}_4\text{ClO}_4$ Decomposition with Nitrates of La, Ce, Nd, Sm, Eu

Rashmi Kumari<sup>1</sup> and M. R. R. Prasad<sup>2\*</sup>

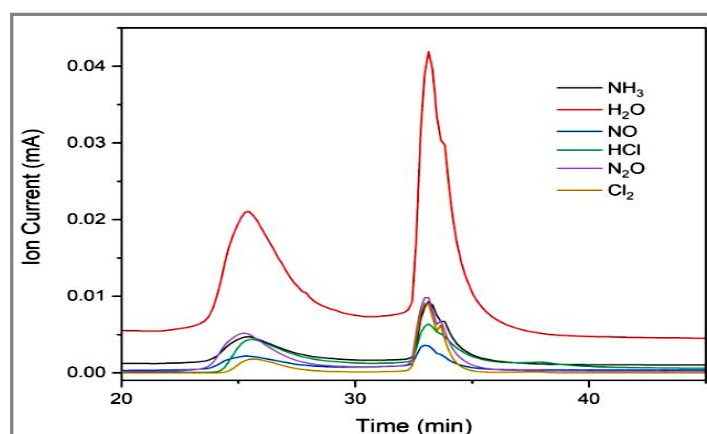
1. Junior Research Fellow, Department of Chemical Engineering, IIT -Gandhinagar, Palaj-382355, Gujarat, **INDIA**
2. Scientist/Engineer – SF (Retired), Vikram Sarabhai space Centre, Indian Space Research Organization, Department of Space, Government of India, Thiruvananthapuram – 695022, Kerala, **INDIA**  
Email: [mandapaka.p@gmail.com](mailto:mandapaka.p@gmail.com), [rashmi809@gmail.com](mailto:rashmi809@gmail.com)

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### ABSTRACT

Thermal decomposition of ammonium per chlorate in the presence of lanthanide (Ln) nitrates, where  $\text{Ln} = \text{La}, \text{Ce}, \text{Nd}, \text{Sm}, \text{and Eu}$  is studied. The analytical techniques of mass spectrometry (MS), thermo gravimetric (TG), and differential Scanning Calorimetry (DSC) have been employed. In all the cases of Ammonium Per chlorate (AP)-Lanthanide nitrate mixtures, the major product evolved is  $\text{H}_2\text{O}$ . Besides  $\text{H}_2\text{O}$ ,  $\text{HCl}$ , and  $\text{NH}_3$  are common products released.  $\text{N}_2\text{O}$ ,  $\text{Cl}_2$ , and  $\text{O}_2$  have not been observed in the case of pure AP. In the case of AP-Samarium nitrate system  $\text{NO}$  is not observed, and  $\text{O}_2$  is the other major product evolved. The cessation of decomposition of AP after an initial conversion of 30 percent is modified in the presence of nitrates of La, Nd, Sm, and Eu in the range between 35 % and 50%. In terms of heat release, Samarium nitrate gives better energy output ( $1207 \text{ J g}^{-1}$ ).

### Graphical Abstract



TG-MS peaks corresponding to pure AP-Neodymium Nitrate.

**Keywords:** Ammonium, per chlorate, lanthanide nitrates, MS, TGA, DSC.